Claims

1. A phosphorus-modified silane which contains at least one methoxy group bound to the silicon and has the general formula I:

$$R^5{}_2\overset{O}{\overset{\|}{P}}-(CR^4{}_2)-Si(R^1)_a(R^2)_{3-a} \qquad (I)$$

where

the radicals R^1 are each, independently of one another, a substituted or unsubstituted alkyl, alkenyl, cycloalkyl or aryl group having from 1 to 18 carbon atoms or an alkoxy group having from 2 to 18 carbon atoms,

R^2 is a methoxy group,

the radicals R^4 are each, independently of one another, hydrogen, an alkyl, cycloalkyl or aryl group which has from 1 to 18 carbon atoms and may be substituted by fluorine, chlorine, alkoxy, amine, cyanate or isocyanate groups or be unsubstituted,

the radicals R^5 are each, independently of one another, a substituted or unsubstituted alkoxy group or aryloxy group having from 1 to 18 carbon atoms, a substituted or unsubstituted polyalkylene oxide having from 1 to 4000 carbon atoms and

a is an integer from 0 to 2,

with the proviso that R^1, R^4 or R^5 can together be part of a cyclic compound.

2. A process for preparing phosphorus-modified silanes which contain at least one methoxy group bound to the silicon and have the general formula I:

$$R^5{}_2\overset{O}{\overset{\|}{P}}-(CR^4{}_2)-Si(R^1)_a(R^2)_{3-a} \qquad (I)$$

where

the radicals R^1 are each, independently of one another, a substituted or unsubstituted alkyl, alkenyl, cycloalkyl or aryl group having from 1 to 18 carbon atoms or an alkoxy group having from 2 to 18 carbon atoms,

R^2 is a methoxy group,

the radicals R^4 are each, independently of one another, hydrogen, an alkyl, cycloalkyl or aryl group which has from 1 to 18 carbon atoms and may be substituted by fluorine, chlorine, alkoxy, amine, cyanate or isocyanate groups or be unsubstituted,

the radicals R^5 are each, independently of one another, a substituted or unsubstituted alkoxy group or aryloxy group having from 1 to 18 carbon atoms, a substituted or unsubstituted polyalkylene oxide having from 1 to 4000 carbon atoms and

a is an integer from 0 to 2,

with the proviso that R^1, R^4 or R^5 can together be part of a cyclic compound, characterized in that compounds of the general formula II:

$$X-(CR^4{}_2)-Si-(R^1)_a(R^2)_{3-a} \qquad (II)$$

where

X is fluorine, chlorine, bromine or iodine,

are reacted with compounds of the general formula (III):

$$P(R^5)_3 \qquad \text{(III)}.$$

3. The process as claimed in claim 2, characterized in that the reaction is carried out at temperatures of from 0 to 300°C.

4. The process as claimed in claim 2 or 3, characterized in that the reaction is carried out at temperatures of from 80 to 170°C.

5. The process as claimed in at least one of claims 2 to 4, characterized in that the reaction component of the general formula III is reacted in an excess of from 0.01 to 300 mol% with a silane of the general formula (II).

6. The process as claimed in at least one of claims 2 to 5, characterized in that the reaction component of the general formula III is reacted in an excess of from 10 to 100 mol% with a silane of the general formula II.

7. The process as claimed in at least one of claims 2 to 6, characterized in that the reaction is carried out in the absence of a solvent.

8. The process as claimed in at least one of claims 2 to 7, characterized in that the reaction is carried out at a pressure of from 1 to 10 bar.

9. The use of the phosphorus-modified silane of the general formula I as claimed in claim 1 as additive in antifreezes or as coating agent.

10. A cohydrolysis of the phosphorus-modified silanes of the general formula I as claimed in claim 1 in combination with alkoxyalkylsilanes for preparing functionalized resins.